Master Thesis Research Proposal

Title of the study	Utsida - Intelligent Decision Support System to Aid the Process of Finding and Approving Exchange Courses
Responsible people	Lars Liverød Andersen and Truls Mørk Pettersen
Time period for the study	Master's thesis spanning over both autumn 2016 and spring 2017
Amount of resources in PM planned	8 hours a day for 38 weeks, resulting in a total of 1520 hours (760 for each student)
Web address for the project (if any)	Currently none

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Norwegian University of Science and Technology

1 Purpose

Studying abroad can be an important way to improve intercultural communication skills that are increasingly more important in international businesses and for cooperation between different cultures.[6] Many students choose to go abroad by doing an exchange program or a study-abroad program. These programs usually lasts for 6-12 months where the student is studying at a university in a different country. To apply for exchange or study abroad at the Norwegian University of Science and Technology (NTNU) the students has to find and pre-approve courses which are desired to take at the university abroad. The process of planning and choosing courses is a time consuming and tedious task, where both the supervisor and student has to undergo a large amount of manual work. Also, it proves to be a challenge for students to find suiting subjects to choose at all. The purpose of this research, is to propose the hypothesis that this process can be replaced by an information system (IS) that automates a large part of the manual work, as well as intelligently recommend courses to choose. It could possibly also increase the students motivation, resulting in higher number of students that choose to study abroad.

A study by Mazzarol and Soutar[2] shows that students' general motivation is influenced by the amount of information on the university and its courses. Among the several factors which was reviewed in the study, the "knowledge and awareness" factor proves to be the most influencing one for choosing an international study location. Therefore, when investigation how an IS can improve this process, proper information is key.

Several approaches has been made to replace the manual process of choosing courses with an IS. One example is by using a decision support system that advises the students on their course selection based on their program requirements and the course's prerequisites, as done at the University of Dhaka[4]. Student course recommendation can be done intelligently by using AI techniques such as case based reasoning to give relevant results. Sherpa[1] is a system that has been made especially for the goal of giving course recommendations. Data mining techniques can also be used to predict whether a student will fail or pass on a course[5].

Software engineering varies from other fields of study by having a more practical approach to the research. This paper primarily focus on preliminary research in how the promoted IS can be implemented, what it can do to provide a optimal contribution to NTNU, and whether intelligent recommendation can increase the motivation for students to do a study exchange program. The following list summarize the concise research questions which this research will try to answer:

RQ1: **What parts of the pre-approving process of the study exchange program application can be automated?**

RQ2: **How can an automated system for finding exchange courses be designed to increase the amount of students that goes on exchange?**

RQ3: **How accurate and correct can intelligent subject recommendation be when choosing exchange courses?**

2 Contributions

This research's contribution will yield a new computer based artifact; specifically an Intelligent Decision Support System (IDSS) with the goal of both motivating and making it easier for students at NTNU to apply for a study exchange program.

This research will invent a new innovating course recommendation engine, that can be applicable for several universities. Aside from simplifying this process, the research will contribute by giving new insight and knowledge about what an IS can do to increase the motivation for students to apply for a study exchange program, and if it is possible to completely automate this process, as well as providing automated intelligent educated guesses for the most suitable and relevant courses a student should choose. Considering this research objective is primarily designed as a contribution to NTNU, who currently does most of this process manually, if this research and product proves to be successful, it will be a great contribution for NTNU. All though there exists similar systems in other universities which focus on some of the same objectives as this research, commercial-off-the-shelf (COTS) products can not be implemented, when the dependencies and infrastructure is so different for different universities.

3 Research Method

Initially, the research originated from experiences and motivation. Several acquaintances applying for a study exchange program has left the impression that the process to do this both on- and from NTNU has been a time consuming hardship. Since this is an encouraged action at NTNU, their IS should do so as well. The research questions developed from this motivation, and by reviewing NTNU's current systems for this process. A literature review was conducted to establish a conceptual framework for the thesis. This included investigating whether there are similar systems established in other universities which provide similar functionality, and if these systems could elaborate knowledge on our research questions. The strategy is to design and create a computer based artefact. To assure that the research questions will be answered, and the product as a contribution will be valid, it is important to conduct qualitative interviews with employees at NTNU who are knowledgeable of the this domain. For the system to actually be functionally valid, we will carefully study the documents and diagrams which define the dependency and structure of NTNU's subjects and rules. It is also of essence to learn if a new IS could motivate students to apply for this process, which will be answered with qualitative questionaires and interviews with eventual users of prototypes and early implementations.

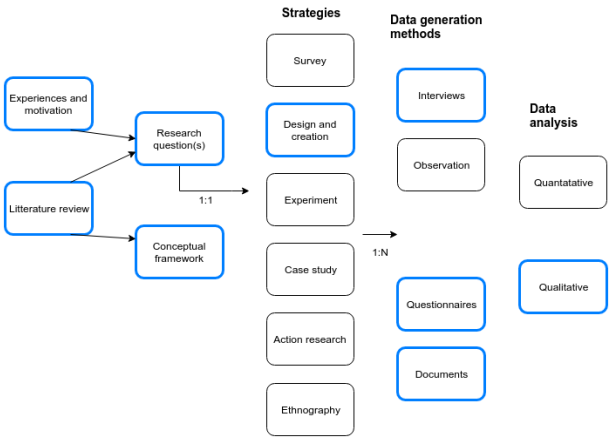

Figure 1: The outlined research process[3]

4 Participants

The research is supervised by Associate Professor Rune Sætre. He originally proposed the research idéa for us, which we further developed. Sætre is experienced in the field of software development, and is connected to the process of applying for study exchanges, as well as knowledgeable of subject dependencies at NTNU. Sætre will serve as our main informant on domain knowledge.

When the system has matured to a prototype, it is desired to find relevant test users. We plan to advertise on campus with posters, and through social media to find students who are interested in applying for a study exchange program. The goal is to find five students who are willing to test this process through our IS, and report their experiences with it through a carefully constructed Google Docs survey. Because this survey will be done digitally, we will apply for allowance from NSD before using it, and store results on paper. This data will be used to eventually change the system, or for further development. These testers are considered participants in the research, and their personal information will only be known by us, and be anonymous in the data presented in the final report.

5 Research Paradigm

This study will firstly focus on qualitative data, gained by interviewing key persons, and studying existing documents and diagrams, as well as investigating if the contribution will increase motivation, which can be viewed upon as subjective and individual. Furthermore, as stated by our motivation for performing this research project, it's hard to avoid being biased in some form. These factors all relate most closely to the interpretivism paradigm. We therefore conclude that our way of thinking throughout the research will be categorized as this paradigm.

6 Final Deliverables and Dissemination

The results of this research will be presented in a delivered report (the master thesis), along with the source code for the developed software.

References

[1] Bramucci, R. & Gaston R. (2012), *Sherpa: increasing student success with a recommendation engine*, in Proc. of the 2nd International Conference on Learning Analytics and Knowledge, p. 82-83.

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[3] Oates, B. J. (2006) *Researching Information Systems and Computing*. SAGE Publications.

[4] Roushan, T. and Chaki, D. et al. (2013), *University course advising: Overcoming the challenges using decision support system*, in Computer and Information Technology (ICCIT), 16th International Conference on, 2014, p. 13-18.

[5] Vialardi, C., Bravo Agapito, J. et al. (2009), *Recommendation in higher education using data mining techniques* in Proceedings of the 2nd international conference on educational data mining, p. 190–199

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